

1991 Groundwater Protection in Virginia

Fourth Annual Report of the Groundwater Protection Steering Committee

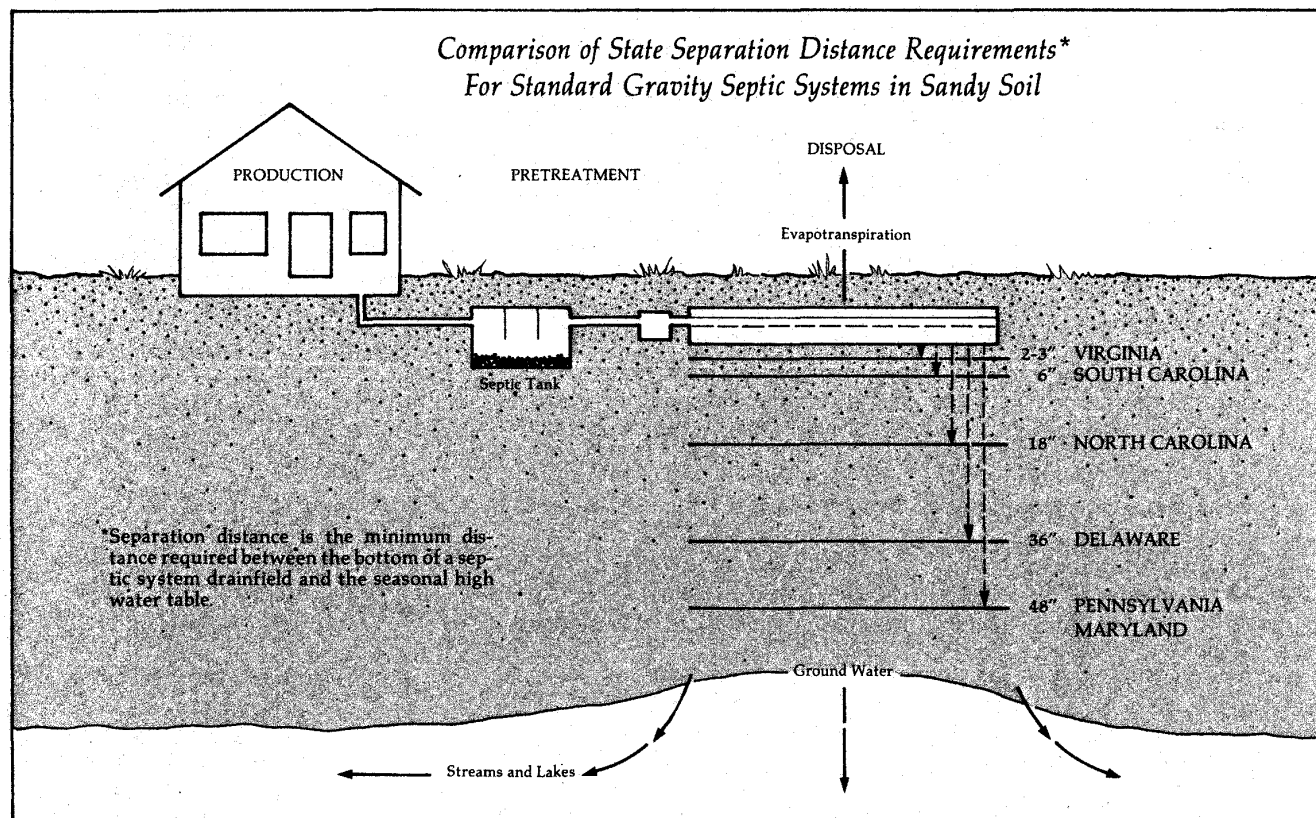


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Task Force Recommends Septic Changes

In October 1990, three Virginia Cabinet Secretaries took the innovative step of appointing a joint Task Force to consider changes in the state's onsite sewage handling and disposal regulations. Nine months later, members of the Task Force recommended the state tighten regulations by increasing the minimum separation distance required between septic trenches and groundwater. Their report is expected to lead to the issuance of proposed new regulations in the coming year.

As with many states, Virginia's onsite sewage regulations were originally designed to prevent surface ponding of waste. Little attention

see *Task Force* page 4

The Road Ahead May Be More Difficult

Significant progress has been made since the Groundwater Protection Strategy for Virginia was completed in 1987. A variety of legislative, regulatory and administrative accomplishments have been described in earlier Annual Groundwater Reports. In 1990, the Groundwater Protection Steering Committee reviewed progress to date and reaffirmed the basic directions set forth in the Strategy—to emphasize prevention over remediation, to maintain a basic anti-degradation stance and to emphasize greater coordination among state programs along with a significantly greater degree of involvement for local governments.

Where the state is today, however, could be described as a sort of “glass half full / glass half empty” situation. In addition to the accomplishments of the past and those described in this Fourth Annual Report, it must also be recognized that much remains to be done.

The 1987 Strategy came at a time when a number of significant initiatives were about to get underway and when the state’s fiscal situation was less strained than it is today. The 1987 Strategy capitalized on these favorable conditions and got a strong beginning. Now that much has been accomplished, the question arises of whether that initial momentum can be maintained? Have the easiest steps already been taken? Will the road ahead be more difficult? What are the major challenges that we face?

Challenge #1: Building Groundwater Awareness

Virginians are fortunate that we have not experienced widespread groundwater contamination problems of the type experienced in some other states. As a result, our citizens and leaders have not been forced to confront the urgency or costs of replacing valuable water supplies. Many of us engage in practices as households, as farmers and foresters, as businesses and institutions which seem to

us innocent enough but which could, and perhaps do, damage groundwater. Most of us are not aware of this or prefer to wait for some cue that now is the time to change. It is ironic but commonly recognized that the motivation to plan to prevent future problems is strongest after a crisis. The challenge is to find ways to learn from other’s mistakes and from our own shortcomings without stubbornly waiting for more serious problems to get our attention.

Greater public awareness is needed as the basis for improved groundwater citizenship and as a stimulus to voluntary change. Increased public awareness is also needed as a basis for garnering future political and financial support. Outreach and educational efforts aimed at state and local leaders, as well as the water supply industry, need to increase.

Challenge #2: Building the Factual Data Base

One of the reasons Virginians are not more aware of actual and potential groundwater problems is the lack of an adequate data base that can define critical issues and provide technical backing for difficult decisions. It is important that we be able to monitor how we are doing in actually protecting the groundwater resource as a result of the legislative, regulatory and administrative improvements that we are making. Basic data is needed to guide site specific protection activities - to delineate wellhead protection areas and the zones of contribution around them, for instance. There is much data that already exists but it is not always in a readily accessible form. Managing data is a major challenge—especially since the volume of data is going to increase with new reporting requirements like those in the Safe Drinking Water Act or like the new groundwater monitoring requirements for solid waste landfills. Beyond simply counting and measuring conditions, support is also needed

for studies which will address strategic research questions such as BMP effects on groundwater, alternative on-site waste treatment and disposal systems, and ties between groundwater and surface water problems in bodies like the Chesapeake Bay.

Think of three or four really important groundwater quality, quantity or use questions. Then ask yourself where you would go to find the data or studies to answer those questions. The unfortunate likelihood is that nobody has that information or it exists in bits and pieces in agency files but it has not been compiled so as to be useable. Finding ways to set priorities among the vast array of data collection, management and research needs continues to be a major challenge.

Challenge #3: Balancing Differing Interests

Even with increased public awareness and with better data, the challenge of balancing competing interests and agreeing on an equitable allocation of scarce natural resources presents a significant political as well as legal challenge. We already see in the groundwater management areas in the eastern part of the state that lawful rights to withdraw groundwater exceed the rate of natural replacement by a significant margin. The result, in the not too distant future, may be that users will find themselves competing more for limited supply and increasing the potential for negative impacts such as salt water intrusion and dewatering confined aquifers. If we consider also users such as agriculture which is exempted from withdrawal permit requirements or the many small users who together can have a significant cumulative effect, it is clear that a major challenge exists to both groundwater and surface water management. Can we develop criteria and procedures in laws to support an equitable system for addressing scarce quantities? To a greater degree than in the past, groundwater quantity management will have to be thought of as part of groundwater quality protection.

Challenge #4: Linking State Actions with Those of the Federal and Local Governments

From the beginning of the Groundwater Protection Steering Committee in the mid-1980's, it has been recognized that many agencies of state government have either direct or indirect responsibility for programs affecting groundwater. A dozen agencies now sit on the GWPSC. This ad hoc committee has been continued each year because it serves many useful cross-agency functions - information sharing, coordination of activities, joint funding, etc.

The Committee has supported changes in local government's planning and zoning laws to enable them to better address groundwater concerns and has taken the initiative with pilot programs to demonstrate methods such as DRASTIC mapping and wellhead protection. A number of local governments are now giving groundwater protection the priority it warrants. These points of light, however, can be counted in the dozens not in the thousands, and their combined effect is significantly less than what might be thought of as integrated state-wide resource protection.

The Federal Government appears to be modifying its thinking and its funding pattern to change from traditional pollution sources funding to what is now being referred to as coordinated funding, where the focus is the resource rather than the organization. At the state level, the Commission on Population Growth and Development is examining the state from a wide ranging strategic perspective. We are optimistic that concepts like carrying capacity and sustainable levels and patterns of development will guide their eventual recommendations. One of the biggest challenges to the Commission and to the GWPSC is to figure new ways to manage the environment through a system that includes federal, state, and local components. At some point perhaps a new structure will come into existence that will go well beyond what a steering committee can provide.



Challenge #5: Providing Funding and Staffing

Virginia today is not alone in facing serious budget limitations - neither are we probably the worst off compared to other states. Nonetheless, it is apparent that people today are less confident than a few years ago that state or federal funds will be there to support all the essential groundwater related functions. It seems unlikely that significant additional funds will go to groundwater efforts.

Agencies have adapted to this situation by belt tightening and in some cases shifting staff to functions where federal or state support are available. Some staff are now being hired on "soft money" from grants rather than as permanent employees. Some agencies have been forewarned that next year's federal grants will likely be only 60% or 70% of the current year's. Some federal monies that were relied upon in the past are now going to be available only on a competitive basis and there is no guarantee that another state might not beat Virginia in this competition. Federal program managers in some areas are also becoming more directive about what individual states must do in order to maintain funding levels and these directives may not coincide with what the state sees as its priorities. Local governments, urged to do more to protect groundwater, reply that they have neither the resources nor the technical staff necessary therefore they look to the state for financial aid and technical assistance.

New sources of funds such as application fees or various types of surcharges on water use may provide help to resource protection programs generally but because groundwater protection is not primarily a pollution permit issuing activity, these sources of funds may not benefit groundwater protection substantially even if such measures are adopted. Groundwater programs in Virginia, as well as many other states, have never had a lot of fat but whatever there may have been has now been cut. Some would argue that what has been cut in recent months is not fat but muscle and that the challenge is to invent ways to replace it before permanent damage is done.

The Road Ahead

Perhaps the steps already taken between 1987 and today have been the easy ones compared to the challenges now faced in protecting and conserving groundwater. Knowing what these challenges are and bringing them to the attention of citizens, government officials and private sector leaders may be a necessary next step in a long term groundwater strategy. As Groundwater Protection Steering Committee members, we pledge ourselves to work to overcome these challenges and not to allow them to become insurmountable obstacles. We urge others to do the same. As you read this Fourth Annual Report, note the many accomplishments of 1991 but also keep in mind the challenges ahead.

was given to the possibility of groundwater contamination. All efforts to alter this in the past decade were stymied.

Two years ago, Virginia's Chesapeake Bay Local Assistance Department proposed to increase the minimum separation distance required between the bottom of septic trenches and groundwater from 2 inches to 18 inches, as part of their efforts to protect water quality in the Chesapeake Bay. That proposal and a similar proposal by the state Health Department several months later met with strong opposition from realtors, developers, local government officials, and others concerned about what stricter regulations would mean for development potential and local tax revenues. At the same time, environmental groups argued that not changing the regulations would mean tremendous clean-up and replacement costs in the long run.

Because of the sensitivity of the issue, the Secretaries of Health and Human Services, Economic Development and Natural Resources decided to convene a Task Force comprised of individuals representing the views of all affected interests. They charged the group with examining the adequacy of current regulations and the impacts of any proposed changes, and asked the Institute for Environmental Negotiation to staff and facilitate the effort. Funding came from both the Health Department and the State Water Control Board.

In monthly meetings from October to June, participants reviewed the scientific literature, heard from national and regional experts about regulations in other states, (see page 1) and examined data on well contamination in Virginia. At the end of that time, Task Force members reached consensus on a number of major recommendations. They include recommendations:

- to increase minimum separation distance requirements in sandy soils from 2 and 3 inches to 24 and 18 inches, depending on soil type

- to broaden the use of low-pressure distribution and other kinds of alternative disposal systems
- to reduce installation depth requirements from 18 to 12 inches when certain alternative technologies are used
- to require certification and training of those who design, install and inspect alternative systems
- to require more routine maintenance of all onsite systems.

In their transmittal letter to the three Secretaries, Task Force members said:

We believe the recommendations contained in this report represent a reasonable balance between the need for change and the need to mitigate the burdens of change as much as possible, consistent with goals of protecting human health, water quality and economic vitality.

The recommendations reflect a recognition on the part of all participants that safe, reliable, onsite waste disposal systems are vital to human and economic health in rural Virginia communities, and that changes in the regulations for installing onsite waste systems are needed if the state is serious about protecting its groundwater. The Task Force's report emphasizes that every effort needs to be made to mitigate the impacts of change. Considerable emphasis is placed on pursuing promising alternative technologies like constructed wetlands to increase disposal options and improve the effectiveness of onsite waste treatment.

The report has been endorsed by the three Secretaries and their staffs and will be reviewed by the state's Sewage Handling and Disposal Advisory Committee prior to the initiation of formal regulatory change. Secretary of Economic Development, Lawrence H. Framme, labelled the Task Force report "well done" and remarked that "it reflects a balanced approach to assuring groundwater quality and economic vitality." Northern Neck developer and Task Force member Jimmy Carter commented that "it's an environmental step forward and with

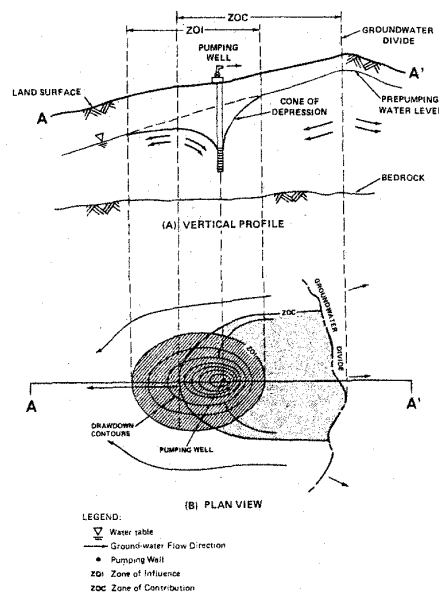
new technologies, I don't think it will have much effect on development."

These are encouraging signs that the changes in septic tank regulations called for in the 1987 Strategy and the 1990 Supplement will now come to fruition. The success of the endeavor may well lead to other jointly sponsored initiatives in the future.

Wellhead Protections Proposed for Public Wells

The 1990 Safe Drinking Water Act amendments call for states to establish wellhead protection programs to protect local drinking water supplies. This initiative grew out of crises that have occurred across the country as major public water wells have become contaminated. Recent studies conducted in Minnesota estimated that groundwater pollution has already cost the 35 cities surveyed in excess of \$67 million with, in some cases, no end in sight. While Virginia has been fortunate relative to other states up to this point, the City of Manassas in Prince William County, the Town of Berryville in Clarke County, and the Town of Fincastle in Botetourt County, have all experienced groundwater contamination impacting their public wells and had to face the accompanying clean-

Terminology for Wellhead Protection



up or replacement costs.

In response to the federal requirement and the state's over-all concern for groundwater protection, the Virginia State Water Control Board and the Virginia Groundwater Protection Steering Committee appointed an ad hoc committee to develop recommendations about well-head protection in Virginia.

The Committee was composed of local government planners, public works officials and representatives of key state agencies. They held six meetings over an eight month period in which they conferred with EPA officials and representatives of other states about ways to delineate areas to be protected, uses that might need to be prohibited or controlled within these areas, and other aspects of well-head protection plans.

At the conclusion of their work, the Committee produced a report outlining their recommended approach to wellhead protection in Virginia. Key elements in that approach are:

- a voluntary program for local governments in which they take the lead in determining areas to be protected and the type of land use controls that will apply;
- technical support from designated state agencies and state funding of some pilot protection programs;
- incorporation of wellhead protection considerations into local planning and zoning decisions;
- state/local review of the impacts of state actions and permits on well-head protection.

The report provides a local assessment questionnaire (see sidebar) and calls for the state to develop a report that recommends a course of action for local governments to take to protect wellhead areas. Workshops and other outreach efforts could follow.

The Committee's report has been forwarded to the Groundwater Protection Committee (GWPC). Consideration and implementation of the Wellhead Committee's recommendations will be a major item on the GWPC's 1991-92 agenda.

Self Assessment Questionnaire

"Out of Sight - Out of Mind" is a phrase often used to describe people's attitudes toward groundwater. The goal of wellhead protection, however, is to bring public water supply wells into sharper focus so that they can be protected for continued beneficial use. Chapter 15.1 Article 4 of the Virginia Code indicates that localities

shall study or survey groundwater, geology and other factors in preparing and amending their comprehensive plan. In beginning that process, the following questions can help you decide how well informed you are and how well prepared your jurisdiction is to protect its public groundwater supplies.

	Yes	No
1. Do you know how many public wells are located in your jurisdiction?	Y	N
2. Could you locate them on a map?	Y	N
3. Do you know how many are owned by local government and how many are owned by investors or others?	Y	N
4. Do you know which wells pump the greatest quantity of water?	Y	N
5. Do you know how many people they serve?	Y	N
6. Do you know how many wells serve businesses or industry?	Y	N
7. Are there contingency plans in place for the event that any of these wells might become polluted?	Y	N
8. Have any public wells required treatment as a result of testing under the new Safe Drinking Water Act amendments?	Y	N
9. Have any public wells in the past been closed due to contamination?	Y	N
10. Do any public wells have activities within 1/2 mile that might pose a threat (e.g., landfills, abandoned wells, underground tanks, waste lagoons, chemical businesses, septic tanks)?	Y	N
11. Under current zoning, could such activities locate there in the future?	Y	N
12. Does the planning commission have knowledge of the existence of public wells when making zoning decisions?	Y	N
13. Do you have knowledge of the underlying geology and feel confident that the flow of contaminated groundwater would not be in the direction of a public well?	Y	N
14. Are you familiar with the authority under chapter 15.1 of the Virginia Code for localities to adopt measures to protect groundwater?	Y	N
15. Could a problem with the water quality in any of the public wells in your locality have a negative impact on economic development?	Y	N

If more than a few questions are answered "No," then your jurisdiction should consider further

studies of its public wells and consider adopting wellhead protection measures.

Withdrawals Pose Threat to Groundwater Management

The Virginia Water Control Board is authorized by the Groundwater Act of 1973 to declare groundwater management areas where there is reason to believe that groundwater levels are declining, there is substantial well interference, that an aquifer might be depleted or that the groundwater may be polluted. The Board has declared two such groundwater management areas, the Eastern Virginia Groundwater Management Area and the Eastern Shore

Groundwater Management Area.

Under the current law any user that withdraws more than 300,000 gallons per month for non-agricultural uses must obtain either a Certificate of Groundwater Right or a Permit to withdraw groundwater. The Act requires the Board to issue a Certificate of Groundwater Right to any user in a newly declared groundwater management area who establishes their right to withdraw groundwater based on their maximum daily withdrawal in the two years preceding declaration. The General Assembly retained the ability to adjust these rights should the con-

tinued unrestricted use of groundwater prove detrimental to the aquifer system.

Any person who wishes to withdraw additional groundwater in a groundwater management area after its declaration must apply for a Groundwater Withdrawal Permit from the State Water Control Board. The Board may not issue a permit that will deprive those having prior lawful rights of the amount of groundwater to which they are entitled.

The Board's experience in implementing the Act indicates that the continued unrestricted withdrawal by those holding Certificates of Groundwater Right will harm the aquifer system. In the Eastern Virginia Groundwater Management Area Certificates of Groundwater Right have been issued for a daily withdrawal of up to 212 million gallons. Modeling studies, however, indicate that a daily withdrawal rate of 167 million gallons would cause major water level declines, dewatering of some portions of confined aquifers, and an increased potential for salt water intrusion.

The Board's staff estimates that actual 1990 groundwater use does not exceed 95 million gallons per day within this area. In 1987 the Southeast Virginia Planning District staff projected that 1995 usage would be 167 million gallons per day. In addition to the 212 million gallons per day that is authorized by Certificates, Permits have been issued for 31 million gallons per day. Based on modeling studies completed to date, it is doubtful that the aquifer system within this area can support a withdrawal of 243 million gallons per day.

The Board's staff presented these concerns to the State Water Commission on June 26, 1991 and requested that the General Assembly amend the current law that allows this potential conflict to occur.

VWCB Shifts Staff to Address UST Backlog

There are approximately 64,000 regulated USTs at 23,000 facilities throughout the Commonwealth.



Over the past two years the number of reported leaking UST sites has increased dramatically to 2,663. As a result, a backlog of clean-up reports requiring Virginia Water Control Board technical review has occurred. In an effort to begin to address this backlog, the Board has shifted staff resources from other groundwater program areas to the UST program. In addition to this increased staffing, the Board is investigating innovative approaches to allow the State to keep pace with clean-up and tank upgrade activities associated with this program.

The UST Financial Regulation establishes two methods that an owner/ operator (O/O) can use to conduct clean-ups of petroleum releases. The first allows the O/O to clean up the contamination and apply to the Virginia Underground Petroleum Storage Tank Fund for reimbursement of reasonable and necessary corrective action costs incurred between \$50,000 and \$1 million. The Board began reimbursing O/O for corrective action costs in June of this year and has thus far received 11

reimbursement claims for a total of \$900,000.

Under the second method, the O/O conducts corrective action activities up to the first \$50,000 and then requests that the site be accepted as a State Lead Clean-up site. The Board prioritizes the site based on risk to human health and the environment and conducts the clean-up of the site as resources allow. The Board is currently conducting corrective action activities at 71 sites. This includes the provision of alternate water supplies for 46 homes with contaminated drinking water and the conduct of clean-up activities at another 32 sites. There are another 100 sites on the State Lead priority list which will be scheduled for clean-up as staffing allows.

For information on the Virginia Underground Storage Tank technical and financial regulations, contact Russell P. Ellison; for leak clean-up requirements, contact David P. Chance at the Virginia Water Control Board, P. O. Box 11143, Richmond, Virginia 23230 or 804/527-5304.

Managing Development Impacts in Karst Terrain

At the request of the Montgomery County Board of Supervisors, the Council on the Environment prepared a report on managing development in the county's karst terrain. Karst terrain is found in 24 Virginia counties so the Council's report, although focused on Montgomery County, should provide useful information to other localities facing similar problems. The report was prepared with significant input from a wide range of Groundwater Protection Steering Committee member state agencies and describes both the problems of developing in karst terrain and local management programs that address these problems.

Karst terrain is underlain with carbonate bedrock such as limestone and dolomite and contains numerous solution channels and sinkholes. It can be very susceptible to groundwater contamination in that groundwater moves quickly and is often directly influenced by unfiltered surface water. Development in karst areas, if not properly managed, can pose significant risks to groundwater supplies and other natural resources. Improperly designed development also faces risks in karst areas such as

the loss of potable drinking water supplies, flooding, and subsidence.

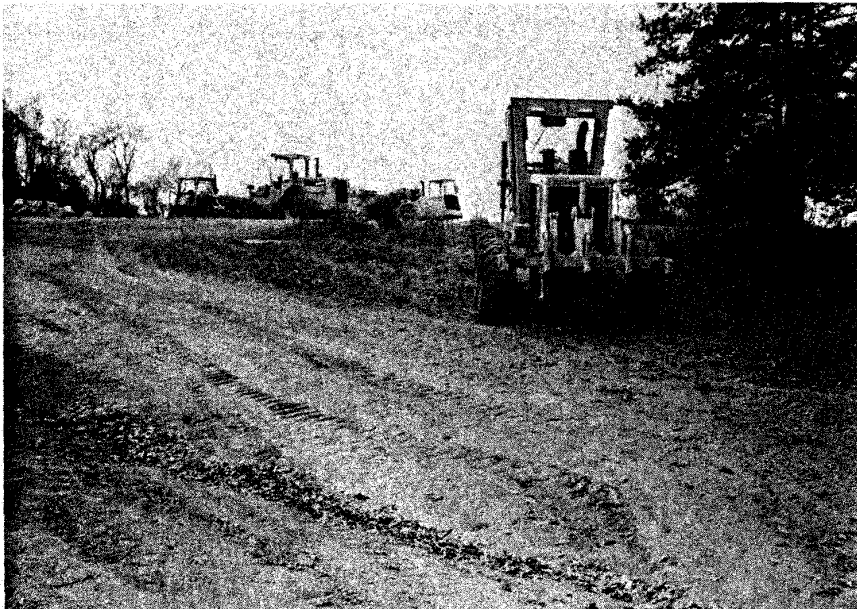
The report makes a number of recommendations to better manage the risks to, and from, development in this type of terrain. The report recognizes the lack of public understanding of the problem, and recommends a regional effort to inform citizens of the problems associated with karst and build support for a higher level of land management in such areas. The report also recommends that the County develop a resource data base to determine the varying sensitivities of different land areas and to link appropriate land management tools to those areas. Prior to developing such a system, the report recommends that the entire carbonate area of the County be considered sensitive to development and that new projects be carefully evaluated on a case-by-case basis. The report also recommends that the County upgrade its requirements for septic system siting and stormwater management in karst areas. Finally, the report suggests that the County concentrate growth wherever possible along public water and sewer lines in "clustered developments." This style of development allows at least the same overall density while making stormwater management and preservation of sensitive land features more practical.

Pesticide Clean Days a Success

Many farms have stocks of outdated or banned or unusual pesticides, which the farmer can neither use nor dispose of properly. Most landfills cannot accept these materials, since most require disposal at a licensed hazardous waste disposal facility. Thus, these materials often remain in ancient containers on the farm where they could be a real hazard to groundwater if spilled or leaked. During the Summer of 1990, the Virginia Department of Agriculture and Consumer Services (VDACS) conducted a pilot project commonly referred to as "Clean Day" in three Virginia counties -Frederick, Clarke, and Northumberland. With the help of the state's Consolidated Laboratories and Laidlaw Environmental Services, VDACS collected and disposed of 31,797 pounds of pesticides from 69 farms in the three counties. The average per-participant cost to the state was \$2,304; an amount that may seem high but compared to the damage prevented, it is a bargain. Clean Day had a tremendous value for the farmer and was a significant step toward better protecting the environment.

Because of the success of the 1990 Clean Day pilot project, VDACS is planning a second Clean Day for five additional counties as yet undesignated. After the second Clean Day, VDACS plans to continue holding Clean Days throughout the state until all counties have been served. Funds for the second Clean Day in the next five counties have been obtained, but thereafter, securing adequate funds for additional Clean Days may be an obstacle.

On another front, VDACS is instituting a multi-media promotional campaign aimed at farmers outside of the Chesapeake Bay region to encourage them to adopt conservation plans and best management practices. This promotional campaign will complement the technical conservation programs of other agencies. At present, VDACS has obtained initial funding to produce radio commercials, has given several radio and TV interviews, and



has had letters to the editor published in several farm publications.

On the regulatory front, the Pesticide Control Board has adopted regulations governing public participation and setting fees. The Board has also published a proposed regulation setting forth requirements for certification and training of pesticide applicators and has published a notice of intent to adopt a new product registration regulation. In response to serious concern regarding the effect of the pesticide Furadan 15G on birds, the Board adopted a risk reduction plan for this chemical. As a result of monitoring during the implementation of the risk reduction plan, the Board adopted an emergency regulation that banned the sale and use of granular carbofuran (Furadan 15G) in Virginia, which became effective on June 1, 1991.

Extension Reaches Out

The Virginia Cooperative Extension Service has continued its educational programs on protection of groundwater resources for farmers, urban dwellers, youth, planning officials and local administrators. Six projects this year were targeted to specific audiences: 1) alternative fertility management for corn production to protect groundwater; 2) herbicide input systems for no-till corn to protect groundwater; 3) leaching of pesticides impact on groundwater; 4) groundwater education for elected/appointed planning officials in rural areas and on the urban fringe; 5) water quality education for rural households, and 6) nutrient and pesticide use management in urban areas. A groundwater protection component has been incorporated into other ongoing educational programs as well. These programs are coordinated with and often supported as a part of the Groundwater Protection Steering Committee and other agency programs.

The Extension Service's Water Quality Programming Committee recently adopted seven program areas for its 1992-1995 plan of work. They are: fertility management/leaching,



small flow and sewage treatment, local management, IPM/pesticide use/leaching, urban nutrient/pesticide management, youth education, and forestry management practices. Groundwater protection is a key element in each of program areas. Persons desiring more information should contact the Extension service office nearest them.

Waste Management and Groundwater

In June 1991, The Virginia Department of Waste Management began distribution of Waste Minimization reports to businesses and governments. The reports highlight alternative management programs designed to reduce the toxicity and volume of waste generated in Virginia. Printed information, video tapes and technical assistance on both high- and low-technology strategies and techniques are available to waste generators. Topics include managing empty containers that held hazardous materials; reducing operational waste in the commercial printing, metal refinishing, and photographic processing industries; substituting detergent and water-based materials for caustic and solvent cleaners; and different reuse and reduction strategies such as waste exchanges. Efforts to reduce the toxicity and quantity of wastes will have a significant impact

on reducing the potential for groundwater contamination.

Other news... Groundwater monitoring at sanitary landfills went into effect on July 1, 1991. All sanitary landfills without existing groundwater monitoring wells are now required to establish at least four groundwater monitoring wells: one up gradient and three down gradient. Landfills that had groundwater monitoring wells when the new regulations became effective have until July 1, 1992 to bring the wells into compliance with the new requirements. From these monitoring wells, data will be provided quarterly to the Department of Waste Management concerning the waste facility's potential impact on the quality of the groundwater in the uppermost aquifer underlying the landfill. Facilities have one year to set up their baseline data, and 6 months following that to run statistical tests.

Maps and GIS Aid Groundwater Protection

Clarke County residents concerned with better management of groundwater now have a better chance of reaching their goals, thanks to two new publications by the Virginia Division of Mineral Resources. "A Geologic Map of Clarke County, Virginia" and "Map of Hydrogeologic Components for Clarke County, Vir-

ginia" are among 12 publications produced by the division during the 1990-91 fiscal year. The research division of the Department of Mines, Minerals and Energy, continually produces books, maps, articles and other specialized documents on geologic features in the Commonwealth. The information is particularly useful in protection of groundwater resources.

Robert C. Milici, Virginia State Geologist and Director of the Division said the division's geologic maps, which are its principal product, provide basic information for hydrologic studies, identifying potential aquifers, areas of potential recharge, soluble formations, production potential and geologic structures that affect groundwater quantity and flow paths. The division also maintains a variety of databases of geologic data and a water well sample repository.

The division currently is working on more than 60 research projects and expects to publish about a dozen documents during the 1991-92 fiscal year. A list of DMR publications is available from the Division of Mineral Resources, Natural Resources Building, Alderman and McCormick Roads, Charlottesville, VA 22903 (804) 293-5121 or SCATS 487-0121.

Also published in 1990-91 were:

- Geology of the Keen Mountain Quadrangle, Virginia
- Geology of the Grundy Quadrangle, Virginia
- Geology of the Virginia Portion of the Harman and Jamboree
- Geology of the Virginia Portions of the Patterson, Bradshaw, and War Quadrangle
- Travertine - Mark Stream Deposits in Virginia
- Heavy Mineral Studies - Virginia Inner Continental Shelf
- Physiographic Diagram of Virginia
- Minerals of Virginia
- Geology and Virginia

The Department of Mines, Minerals and Energy is continuing to expand and enhance its Technical

Data Management System (TDMS) for mining and mineral resource information. The system is a hydrologic database for areas of Virginia underlain by coal, which includes all or part of Buchanan, Dickenson, Lee, Russell, Scott, Tazewell, and Wise counties and the City of Norton. The agency has entered data from nearly 10,000 geologic data points in the region, and the information has been employed in a variety of special projects.

DMME staff have used the information to help officials find suitable sites for landfills and industrial developments and to help evaluate potential problems from underground mining. TDMS-generated information has been used as exhibits in hearings, and graphs from water databases have been used to evaluate changes in water quality. Currently, water databases are kept in a personal-computer system, with plans to convert the data to the agency's mainframe computer. In the PC database, there are more than 3,500 records for quarterly analyses and more than 25,000 bi-weekly analyses of groundwater from monitoring points in the coal region.

The DMME's data processing office is rewriting the agency's information management system for surface mining operations, and this rewrite will include databases for surface and groundwater monitoring data. The enhanced system will generate new, easier-to-manage reports and provide the capability to upload water-monitoring data directly from disks or tapes.

Contaminants Found in Water Wells

Two recent studies have confirmed that groundwater is vulnerable to contamination from surface activities.

A study of 1,218 water wells in the Northern Shenandoah valley conducted by Virginia Tech, found that human and animal feces, not chemicals, were the primary sources of pollution. Of the samples drawn from individual water systems, 44% showed

unacceptable levels of coliform bacteria. The three counties were Warren, Page, and Rappahannock.

Janice Woodard, one of the Virginia Tech researchers, commented that, "About 1.5 million, or 25%, of Virginians get their water from private wells like the ones tested in the project. It is up to them to keep tabs on their water quality since state and federal water quality regulations apply only to public water systems."

A second study focused not on the karst area of the Shenandoah Valley but on wells in the Coastal Plain area in the eastern part of the state. This study was conducted by the State Health Department as part of the work done for the Septic Regulation Task Force.

In an effort to evaluate the effectiveness of current septic regulations and whether or not the state needs to change the separation distance requirements, the Department of Health conducted a study of 159 randomly selected wells to see if there appeared to be a link between septic separation distances in sandy soils and well contamination. All the wells studied were located within 150 feet of a drainfield. For purposes of the study, they were divided into wells on sites with drainfields with less than 18" of soil separating the bottom of the trench and the groundwater and those with 18" or more. All septic systems in the study met the 1982 regulations. All of the wells were apparently of approved construction. Some were bored wells, some were drilled wells.

The data were collected during February and March 1991. Three samples were taken from each well. If one or more samples from a well tested positive for fecal coliforms, it was considered a contaminated well for purposes of the study. This was because when a well tested positive for bacterial contamination, the homeowner was encouraged to treat the well to eliminate the contamination. This made subsequent samples from those wells difficult to interpret, but it was considered necessary from a public health standpoint.

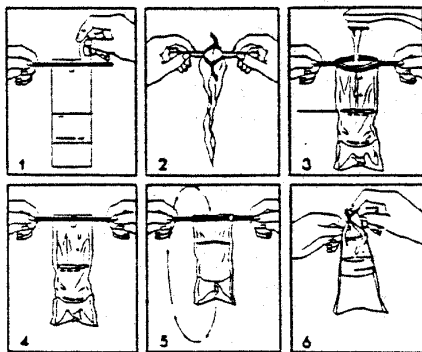
Analysis of the results of the study showed a statistically signifi-

cant difference in the rate of contamination in cases where the separation was less than 18" and where it was 18" or more. Of the 159 total wells tested, 17.6% showed some level of contamination. Of the wells paired with septic systems with less than 18" of separation, 20% were contaminated. Of the wells paired with septic systems with 18" of separation or more, 14.5% were contaminated.

It should be noted that data collected from the six wells in the Northern Neck area appear anomalous. If one takes these six wells out of the total sample of 159, the findings correlated with different separation distances are more dramatic. Without the Northern Neck wells, there was a contamination rate of 17.5% in wells with separation distances of less than 18", 6.8% with separation distances of 18" or more.

While it is possible that other factors like well construction and surface contamination may play some role, the study seems to indicate a relationship between separation distance in drainfields and the likelihood of well contamination. Because the conclusions that can be reached from this one study are limited, further monitoring and controlled studies are proposed as part of the state's on-site waste management program, along with more over-all ambient groundwater monitoring.

Bacteriological Sampling Procedure



Eastern Shore Moves Protect Groundwater

Protection of groundwater has long been a priority of residents, local officials, and state and federal agen-

cies in the Accomack-Norhampton Planning District Commission area. Since 1954 sixteen separate studies have been conducted of the Eastern Shore groundwater resource according to Jack Green, Director of Planning for the PDC. In 1976 Norhampton County requested that the Eastern Shore be included in the state's first groundwater management area. Notwithstanding this designation, local and state officials have continued to seek ways to better understand and to protect and manage the area's groundwater resource.

In January 1990 a groundwater study committee was formed consisting of 9 members - 2 elected officials from each county, the 2 county administrators, a citizen member from each county and the executive director of the PDC. The Committee was charged with developing a plan to protect groundwater. Funding for the work came from a combination of local government appropriations, grants from the State Water Control Board, the Coastal Resource Management Program of the state Council on the Environment, and a General Assembly appropriation.

The first step by the Committee was to identify possible issues and to understand the existing situation. As shown in the table below, industry, which includes two poultry processing plants, was found to be the heaviest groundwater user.

Industry	10.7 MGD
Irrigation	8.7 MGD
Public Water	4.2 MGD
Private Wells	2.0 MGD

Agriculture, animal waste, development, salt water intrusion and providing an adequate high quality water supply to meet future demands were among the threats and challenges identified by the group.

After studying the complicated hydrogeology of the Eastern Shore which contains aquifers at a variety of depths, it was found that these are all recharged from infiltration taking place along the narrow central spine of this peninsula. A management strategy was then developed which keys on protecting this central recharge area.

According to Planning Director Green, the boundary of the recharge area to be protected is to be approximately 2,000 feet on either side of the spine (the highest point of the water table). Development that occurs within this area will need to be constructed to protect the quality of the water and the integrity of the recharge area. Wellhead protection areas will also need to be established around the larger pumping facilities. An area of approximately 5 acres would be needed to provide primary protection to a wellhead. Within this area only activities such as passive recreation should be allowed. Land use ordinances in the outer zones would also be required to protection water quality. Nutrient management in the recharge area will also be extremely important. For the agricultural community this will mean a stricter adherence to farm plans. For subdivisions this will mean developing a nutrient loading model to ensure groundwater protection.

The next step in the Northampton-Accomack Plan is implementation and public education. The Groundwater Protection Steering Committee sees in this case study the type of enlightened self-interest which, it is hoped, other localities will also pursue.

People

Bill Woodfin, a key staff member at the State Water Control Board for 22 years and chair of the Groundwater Protection Steering Committee since its formation, has been appointed to be Director of the Department of Waste Management by Governor Douglas Wilder. This appointment assures that groundwater will continue to be a primary concern in the activities of the Department of Waste Management.

Bob Burnley took over the post of Deputy Executive Director in charge of operations at the State Water Control Board as of October 1991. Formerly Regional Director of the West Central Office, Burnley served the State Water Control Board from 1972 to 1990. His return

to state government brings with it a wealth of knowledge and experience which will benefit groundwater as well as other programs of the Board.

Materials Available

The following are some of the reports and documents recently made available. Request for copies should be directed to the sources identified.

- **1990 Supplement to Virginia's Groundwater Protection Strategy:** contact State Water Control Board, P. O. Box 11143, Richmond, VA 23230 or call 804/527-5201
- **Clean Groundwater: Virginia's Endangered Inheritance,** a video running approximately 23 minutes - contact Beth Bailey, Division of Sanitarian Services, Department of Health, 1500 East Main Street, Suite 144, Richmond, VA 23219, or call 804/786-1750, or contact your local Health Department office.
- **Taking the Mystery Out of Your Site Evaluation; Groundwater Contamination & Your Septic System; Fact and Folklore About Septic Tank Maintenance; and Alternative Septic Systems in Virginia,** four brochures describing issues related to household septic systems. Contact Beth Bailey, Division of Sanitarian Services, Department of Health, 1500 East Main Street, Suite 144, Richmond, VA 23219, or call 804/786-1750, or contact your local Health Department office.
- **Report of the Secretaries' Task Force on Septic Regulations:** contact the Division of Sanitarian Services, Department of Health, 1500 East Main Street, Suite 144, Richmond, VA 23219, or call 804/786-1750.
- **Report of the Ad Hoc Wellhead Protection Advisory Committee:** contact State Water Control Board, P. O. Box 11143, Richmond, VA 23230 or call 804/527-5201

Counties with Drastic Maps More Than Double

The best measure of success of a demonstration project is whether it generates spin-off interest and activity or, to put it another way, whether it has a multiplier effect. Following the adoption of the **1987 Groundwater Strategy for Virginia**, a DRASTIC map training workshop for demonstration projects

in six Virginia counties was initiated by the State Water Control Board and the Groundwater Protection Steering Committee. These six counties have now multiplied and become 16 as other groups have seen the potential of this technique and have funded their own efforts. The count to date includes:

SPONSOR

State Water Control Board / Groundwater Protection Steering Committee

Planning District Commissions

Virginia Water Project

Piedmont Environmental Council

EPA/Monsanto (not released)

COUNTIES

Botetort, Carroll, Henrico, Middlesex, Prince William, Rockingham

Amherst, Greene, Louisa, Nelson, Rockbridge

Shenandoah, Warren

Rappahannock

Augusta, Southampton

This phenomenon of seed money from the state's groundwater activities stimulating action elsewhere is a pattern that hope-

fully can be replicated in other areas, such as wellhead protection, in the future.

- **Managing Development Impacts in Karst Terrain:** contact Local Environmental Planning Assistance Program, Council on the Environment, 202 North Ninth Street, Suite 900, Richmond, VA 23219 or call 804/786-4500
- **Pesticide Use Estimate 1990:** contact Virginia Department of Agriculture & Consumer Services, Office of Pesticide Management, P. O. Box 1163, Richmond, VA 23209, or call 804/371-0152

VWCB Moves Offices

The Headquarters and Piedmont Regional offices of the Virginia Water Control Board are now located at 4900 Cox Road in the Innsbrook corporate complex. The main telephone number is now 804-527-5000.



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*Water quality preservation is everyone's concern. If you suspect
a pollution incident has occurred, please call:*

**Virginia Water Control Board
Pollution Response Program**

for pollution incidents involving surface and groundwater contamination

1-804-527-5200 24-hour Hotline

**Department of Emergency Services
for spills involving hazardous materials
1-804-674-2400 24-hour Hotline**

*Groundwater Protection Steering Committee
Virginia Water Control Board
P.O. Box 11143
Richmond, Virginia 23230*
